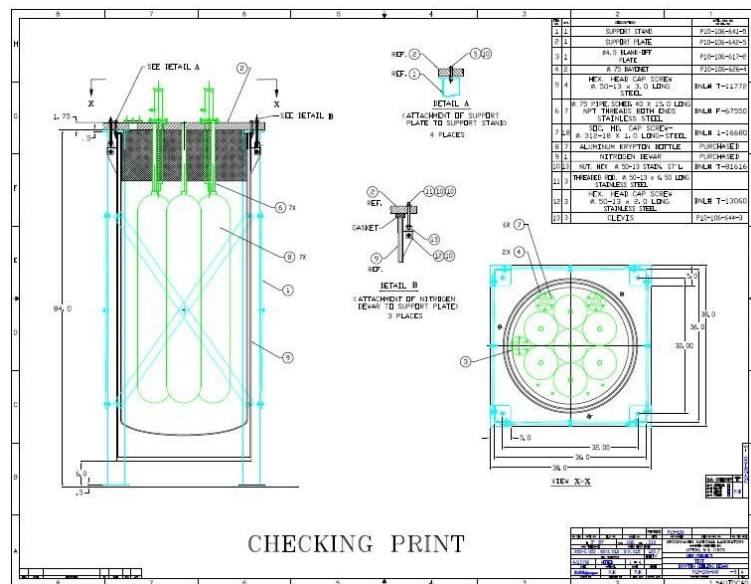


7 Left Over Bottles of Krypton Gas in Physics Dept.

K. C. Wu

9/30/10

Sketch of 7 Gas Bottles Hung on a Top Hat



Krypton, bottles and isolation valves

- Krypton is a **rare gas**
- Bottles - CTC/DOT – **3AL2015**
- Isolation valves – THERMO 2558, Cowin, L.A. Ca.
- A pressure gauge with 60 psi / 400 KPa is installed on top hat, but not connected to the bottles
- Each bottle has **~ 8 inch** O.D. and **~ 48 inch** height
- Bottles have flat bottom

A chart on some gas cylinders

Cylinder descriptions (originally from <http://www.voltaix.com/prod/cylides.htm> on 3/24/99)

CYLINDER SIZE	DOT SPECIFICATION	NOMINAL DIMENSIONS	TARE WEIGHT	INTERNAL VOLUME	REMARKS
49	3AA2400	24x140 cm. 9x55 in.	61 kgs. 135 lbs.	49.5 liters 3020 in. ³	Steel
44	3AA2265	23x130 cm. 9x51 in.	52 kgs. 115 lbs.	43.9 liters 2680 in. ³	Steel
30	3AL2015	20x122 cm. 8x48 in.	22 kgs. 48 lbs.	29.5 liters 1800 in. ³	Aluminum
16	3AA2015	18x84 cm. 7x33 in.	21 kgs. 47 lbs.	16.4 liters 1000 in. ³	Steel
8	3AA2015	18x46 cm. 7x18 in.	11 kgs. 24 lbs.	7.8 liters 475 in. ³	Steel
6	3AL2216	18x40 cm. 7x16 in.	7 kgs. 15 lbs.	5.9 liters 360 in. ³	Aluminum
3	3AA2015	10x43 cm. 4x17 in.	4 kgs. 9 lbs.	2.8 liters 172 in. ³	Steel
1B	3E1800	5x30 cm. 2x12 in.	0.75 kgs. 1.70 lbs.	0.46 liters 28.4 in. ³	Steel
SSLB	3E1800	5x30 cm. 2x12 in.	0.75 kgs. 1.7 lbs.	0.46 liters 28.4 in. ³	Stainless Steel
.150	3E1800	4x23 cm. 1.5x9 in.	0.6 kgs. 1.4 lbs.	0.15 liters 9.2 in. ³	Stainless Steel
.075	3E1800	4x13 cm. 1.5x5 in.	0.34 kgs. 0.75 lbs.	0.075 liters 4.6 in. ³	Stainless Steel

High-Pressure Aluminum Gas Cylinders

High-Pressure Aluminum Gas Cylinders

Specifications

There are many different gas cylinder options available for packaging of Air Liquide specialty gas products. While most of our gas cylinders remain the property of Air Liquide, we also fill customer-owned cylinders provided they meet all appropriate safety requirements.

HP Aluminum	DOT Specification	Service Pressure	Approximate Capacity†		Outside Diameter	Height*	Tare Weight**	Internal Water Volume††	
Cylinder Size		psig	cu. ft.	liters	inches	inches	lbs.	cu. in.	liters
47AL	3AL	2216	244	6909	9.8	51.9	90	2831	46.4
30AL	3AL	2015	141	3993	8	47.9	48	1800	29.5
16AL	3AL	2216	83	2350	7.25	33	30	958	15.7
7AL	3AL	2216	31	878	6.9	15.6	15	360	5.9
3AL ^{RS}	3AL	2015	8	227	4.4	10.5	3.5	103	1.7
1AL ^{RS}	3AL	2216	5	142	3.2	11.7	2.3	61	1

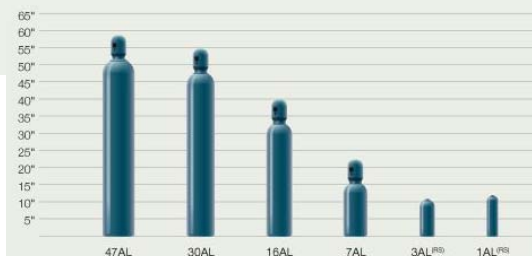
* Without valve.

** With valve, nominal.

† For N₂ at 70°F 1 atm.

†† Nominal.

RS: Resale cylinder only.



Amount of Krypton in Physics Dept.

The 7 bottles of Krypton gas left from the 2001 experiment have been investigated. These bottles are DOT 3AL2015 Aluminum bottles. Each bottle has a nominal dimension of 8 inch OD and 48 inch height. Each bottle has an internal volume of **29.5 Liter**.

From the P&I D and also confirmed by A. Hoffmann, each of these 7 bottles has an isolation valve on top and were connected together using a manifold above the top hat (no longer connected). Today, August uses a gas bottle regulator to measure pressures in each bottle. **All show a pressure slightly above 1600 psi.**

The volume at ambient temperature and pressure of Kr is approximately 138 times that at 1600 psi. Thus, the amount of Kr stored in the 7 bottles equals **~ 7 x 29.5 x 138 ~ 28,000 Liter.**

As a side note, this Kr gas is equivalent to ~ 38 L of liquid Kr.

Price and “Condition” of Krypton – p1

\$1.2 / L for 7,500 L (~\$9,000) of Kr in a 44 L size bottle at ~ 130 bar
– 9/27/10

Per Pavel Perlov
Global Director of Business Development
Electronic Fluorocarbons, LLC
tel. +1-508-435-7700
fax +1-508-625-1368
mobile: +1-617-592-3820
email: pavel@electronicfluorocarbons.com

\$1.6 / L for 1 → 5,000 L and \$1.4 / L for > 5,000 L,
\$1.3 / L > 10,000 L and \$1.25 / L > 20,000 L – 10/1/10

Scientific Grade?,
Per Gerry Isenberg
CTS Welco
Tel. 973-477-7145
Conversation with a representative of CTS Welco, (representing
Praxair), scientific grade Kr has a shelf life of 60 months. Don't
know the detailed, but one probably could assume Kr in the 7
bottles for ~ 20 years may not be 99.999% pure.

Price and “Condition” of Krypton – p2

Robert Pisani has the setup to transfer the gasses to another
bottle. In addition he sent Mike a quote for the non research grade
krypton that was \$7500 for a Size 1 cylinder (10k ltr) so, it has
value. There is a possibility that Spectra gases may buy it from us
in exchange for a credit. (\$ 0.75 / L?)

From BNL buyer J. Cafiero 10/1/2010

Yes I deal with Gerry for stock cylinders for a lot of other chemicals
used here. Ok I received the pricing for various quantities which are
listed below, so the cost per cylinder will vary based on the volume
you are looking for. I can also have the rental and delivery fees
waived, so the total PO cost would be for the Krypton only.

0 to 5000 Liters @\$ 1.60
5001 liters to 10,000 Liters @ \$1.40
10,001 liters to 20,000 liters @ \$1.30
> 20,001 liters and above @ \$1.25

Estimated Value of Krypton in Physics Dept.

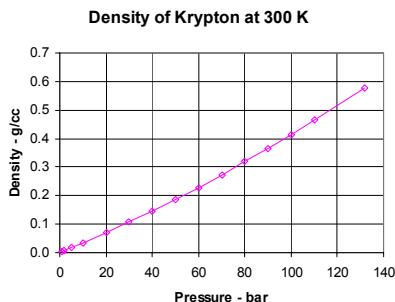
Today, August uses a gas bottle regulator to measure pressures in each bottle. All show a pressure slightly above 1600 psi.

The volume at ambient temperature and pressure of Kr is approximately 138 times that at 1600 psi. Thus, amount of Kr stored in the 7 bottles equals $\sim 7 \times 29.5 \times 138 \sim 28,000$ Liter.

According to the business director of Electronic Fluorocarbons, the price equals $\sim \$1.2/\text{L}$ for 7500 L of 99.888% Kr in a 44 L bottle (~ 130 bar), or $\sim \$9,000$ to the bottle. For 99.99% Kr, the price is slightly lower (4 – 9 %). These are the purchase price. In other words, we need $\sim \$33,000$ to buy 28,000 L of Kr today. As an independent check on price, the price Rob has for UHP (99.995%) grade is lower $\sim \$0.75 / \text{L}$ from other vendor.

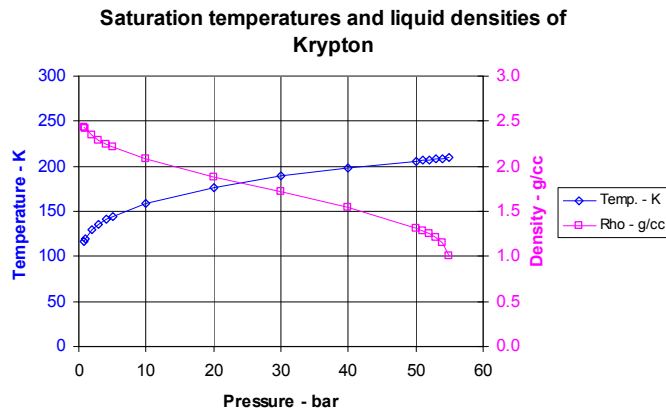
Density of Kr as a function of pressure at 300 K

P bar	T K	P kPa	rho g/cc	P psi
1	300	100	0.00337	14.5
2	300	200	0.00675	29.0
5	300	500	0.01697	72.6
10	300	1000	0.03430	145.1
20	300	2000	0.07004	290.2
30	300	3000	0.107	435.3
40	300	4000	0.146	580.4
50	300	5000	0.187	725.5
60	300	6000	0.229	870.6
70	300	7000	0.273	1016
80	300	8000	0.319	1161
90	300	9000	0.366	1306
100	300	10000	0.415	1451
110	300	11000	0.465	1596
131.6	300	13163	0.577	1910



Note: 1 L of Kr \rightarrow 3.37 gm

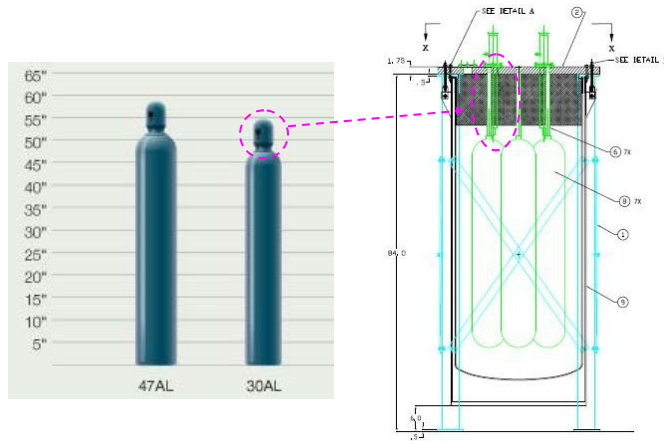
Saturation temperature and liquid density of Kr



Bottles and Gas Transfer

- The following slides show modification made on existing gas bottle and mechanisms of transfer gas without a pump

Compared Standard Bottle to Existing Bottles on a Top Hat



CGA Valve Fittings

CGA Valve Fittings - Gases G through K

GAS	CGA Valve Outlet & Connection
"Genetron 21" (Dichlorofluoromethane)	660
"Genetron 23" (Fluoroform)	660
"Genetron 115" (Monochloropentafluoroethane)	660
"Genetron 152A" (1, 1-Difluoroethane)	510
"Genetron 1132A" (1, 1-Difluoroethylene)	350
Germane	350
Helium	580
Hexafluoroacetone	330
Hexafluoropropylene	660
Hydrogen	350
Hydrogen Bromide	330
Hydrogen Chloride	330
Hydrogen Fluoride	670
Hydrogen Selenide	350
Hydrogen Sulfide	330
Iodine Pentafluoride	670
Isobutane	510
Isobutylene	510
Krypton	580

[↑ Top](#) [→ Next](#)

Gas Cylinder Safety – p1

Lessons Learned: Compressed Gas Cylinders Not Properly Stored

Effective Date: Sep 29, 2010 Point of Contact: [Edward Sierra](#) Identifier: 2010-OR-BWY12-0403 [Provide Feedback](#)

Lessons Learned Statement:

When compressed gas cylinders are not properly stored, it results in unsafe conditions that have the potential for injury to workers.

Discussion of Activities:

An Independent Assessment, Pressure Safety Program and Compressed Gas Cylinder Safety, was conducted at Y-12 National Security Complex/Production Facilities in September of 2009 to assess the effectiveness of implementation of the identified pressure safety and compressed gas cylinder safety procedures associated with the programs.

Emphasis was placed on the inspection and test of the pressure vessels and systems and the storage and handling of compressed gas cylinders.

The assessment identified several locations where compressed gas cylinders were not in compliance with Y73-400, Compressed Gas Cylinder Safety.

Gas Cylinder Safety – p2

Analysis:

The results of the Independent Assessment identified the following:

1. Cylinders stored without protective valve caps.
2. Charged (Full) and empty compressed gas cylinders were not stored separately which made it cumbersome for delivery personnel to readily pickup and deliver cylinders in several locations.
3. Cylinders were found missing the Compressed Gas Association label and/or other labeling identifying the gas within the cylinder in several different locations.
4. Legacy cylinders identified.
5. Storage issues identified:
 - Cylinders were inappropriately nested.
 - Cylinders were found improperly stored or secured.
 - Cylinders not properly secured with chains.
 - Unknown and non-compatible gas cylinders were not segregated
 - Cylinders improperly secured or stored in the upright position.
6. Cylinders stored in front of electrical panels.
7. Wooden skids of cylinders were stored on the ground where they were subject to being stuck by vehicular traffic.
8. At one location, storage of small compressed gas cylinders containing Oxygen and Acetylene as well as two portable Oxygen and Acetylene welding rigs were observed being stored together.

Transfer Kr gas from 7 x 29.5 L bottles to 5 x 43.9 L ones

Bring Kr gas from 7 old bottles to 5 new bottles									
Old bottles		29.5 L			New bottles				
Initially		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		1600	1600	1600	1600	1600	1600	1600	1600
BNJ1	0	643	1028	1258	1395				
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		643	1028	1258	1395	1600	1600	1600	
BNJ2	0	258	568	845	1066	1281	1409		
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		258	568	845	1066	1281	1409	1600	
BNJ3	0	104	290	513	735	955	1137	1323	
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		104	290	513	735	955	1137	1323	
BNJ4	0	42	142	291	470	665	854	1043	
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		42	142	291	470	665	854	1043	
BNJ5	0	17	67	157	283	436	604	781	1190
Remaining		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		17	67	157	283	436	604	781	335

Transfer Kr gas from 7 x 29.5 L bottles to 7 x 29.5 L ones

Bring Kr gas from 7 old bottles to 7 new bottles									
Old bottles		29.5 L			New bottles				
Initially		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		1600	1600	1600	1600	1600	1600	1600	1600
BNJ1	0	800	1200	1400	1500				
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		800	1200	1400	1500	1600	1600	1600	
BNJ2	0	400	800	1100	1300	1450			
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		400	800	1100	1300	1450	1600	1600	
BNJ3	0	200	500	800	1050	1250	1425		
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		200	500	800	1050	1250	1425	1600	
BNJ4	0	100	300	550	800	1025	1225	1413	
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		100	300	550	800	1025	1225	1413	
BNJ5	0	50	175	363	581	803	1014	1213	
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		50	175	363	581	803	1014	1213	
BNJ6	0	25	100	231	406	605	809	1011	
		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		25	100	231	406	605	809	1011	
BNJ7	0	13	56	144	275	440	625	818	1261
Remaining		BOJ1	BOJ2	BOJ3	BOJ4	BOJ5	BOJ6	BOJ7	
Pres - psi		13	56	144	275	440	625	818	339

Other information

- The following slides are for references.

Physical Constants of Kr

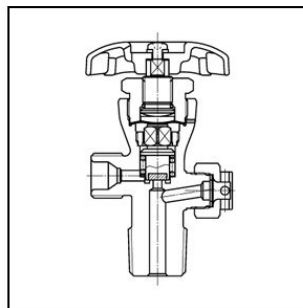
PHYSICAL CONSTANTS		
Chemical name	Kr	
Molecular weight	83.80	
Density of the gas at 70°F (21,1°C), 1 atm	0.2172 lb/ft ³ , 3.479 kg/m ³	
Specific gravity of the gas at 70°F (21,1°C), 1 atm	2.899	
Specific volume of the gas at 70°F (21,1°C), 1 atm	4.604 ft ³ /lb, 0.287 m ³ /kg	
Boiling point at 1 atm	-244.0°F, -153.4°C	
Melting point at 1 atm	-251°F, -157°C	
Critical temperature at 1 atm	-82.8°F, -63.8°C	
Critical pressure	798.0 psia, 55.02 bar	
Critical density	56.7 lb/ft ³ , 908 kg/m ³	
Triple point	-251.3°F, -157.4°C	
Latent heat of vaporization at normal boiling point	46.2 Btu/lb, 107.5 kJ/kg	
Latent heat of fusion at triple point	8.41 Btu/lb, 19.57 kJ/kg	
Specific heat of the gas at 70°F (21,1°C), 1 atm	Cp	0.060 Btu/(lb) (°F) 0.251 kJ/(kg) (°C)
	Cv	0.035 Btu/(lb) (°F) 0.146 kJ/(kg) (°C)

Shipping Data - Kr

SHIPPING DATA	
Synonyms	Kr
CAS Register Number	7439-90-9
DOT Classification	Nonflammable gas
DOT Label	Nonflammable gas
Transport Canada Classification	2.2
Substance Identification (SI)	1056
UN Number	UN 1056
Hazards	High Pressure and suffocation
Toxicity (TLV)	Asphyxiant
Flammability Range (in air)	Nonflammable gas
Odor	None

New Thermo Valve

- Available with a wide range of CGA Outlets
- Available with a cap type safety assembly having fuse metal backed or non-backed copper rupture discs
- In full compliance with CGA and DOT regulations



- Seat material: 15% glass filled Kel-F (Neoflon, Daiflon)
- Optional seat material: Pure Kel-F (Neoflon, Daiflon)
Nylon
Vespel
- Below usually held in stock at Thermo for rapid shipment:
 - CGA 580 with 3775 psi unbacked safety assembly
 - CGA 580 with 4000 psi unbacked safety assembly
 - CGA 590 with 3775 psi unbacked safety assembly
 - CGA 350 with 3775 psi 165°F fusible backed safety assembly
 - CGA 350 with 4000 psi 165°F fusible backed safety assembly

RIX oil-free compressor to ~ 2200 psi

Microboost High Pressure Oxygen Compressors

Check up to five results to perform an action.

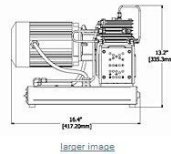
- Maximum Horsepower: 0.5 HP
- Max Discharge Pressure: 2,200 PSIG
- Flow Ranges: 4 to 16 SCFH
- Cooling: AIR
- GAS: O₂, He, N₂, OTHER DRY GASES

RIX Oxygen Compressors have been developed specifically for the exacting requirements of safe, reliable oxygen compression service. The Microboost Series incorporates design features developed over several decades for a variety of industrial and military oxygen compressor applications. These compressors are well suited for the compression of oxygen, helium nitrogen, and other clean, dry gases to 2200 psig. The RIX Microboost high-pressure oxygen compressor will fill up to 25 "D" cylinders (15 cu ft / 425 Liters) in a 24-hour period.

The Microboost is a three-stage reciprocating compressor employing a stepped, oil-free piston. The crankshaft is driven via a speed reducing gearbox on a vertical design crankcase. Heat exchangers, crankcase and compression cylinders are air-cooled.

- High pressure for Oxygen, Helium, Nitrogen and other dry gases including cylinder fill applications.
- Discharge Pressure to 2200 PSIG (152 Barg)
- Flow Rate: 4 to 16 SCFH (0.08 to 0.41 Nm³/H)

[Take a Look at Our Microboost Brochure](#)



Gas Cylinder Comparison Chart

Gas Cylinder Comparison Chart

Air Liquide	Scott	Airgas	Linde	Matheson	Praxair
47AL	KAL	—	—	—	AT
30AL	AL	150A	A31	1R	AS
16AL	BL	80A	A16	2R	AQ
7AL	CL	33A	A07	3R	AG
3AL	—	—	—	—	A3
1AL	—	—	—	—	—

Cylinder Comparison Chart - Airgas

Appendix

Airgas

Specialty Gas Cylinder Size Comparison Chart

Specialty Gas Cylinder Size Comparison Chart							
Approximate Dimensions (inches)	Airgas	Linde	Air Liquide	Praxair	Matheson Trigas	MG	Scott Specialty Gases
High Pressure Steel							
9 x 55	300	049	49	T	1L	300	K
9 x 51	200	044	44	K	1A	200	A
7 x 33	80	016	16	Q	2	80	B
7 x 19	35	007	7	G	3	35	C
2 x 12	LB	LBR	LB	LB	LB	LB	LB
4 x 26	E	005	MEDE	ANE	3L	E	ER
10 x 51	3HP	485	44H	6K	1U	3HP	—
9 x 51	2HP	—	44H	3K	1H	2HP	—
Aluminum							
10 x 52	300A	—	AT	—	—	—	—
8 x 48	150A	A31	30AL	AS	1R	150AL	AL
7 x 33	80A	A16	22AL	AQ	2R	80AL	BL
7 x 16	33A	A07	7AL	AG	3R	33AL	CL
4.5 x 15	9A	—	9AL	—	—	9AL	—

Cylinder Comparison Chart – Matheson Tri-Gas

Introduction

Cylinder Information

Cylinder Comparison Chart

Matheson Tri-Gas Specialty	Electronics	Nominal Dimensions	Material of Construction	AGT	Airgas	Air Liquide	Linde	Air Products	Praxair
B1		30x53	S	1/2Ton				A-5	HT
1F		15x50	S	LP30	350	110	110	A-1	PX/FX
		12x43	S	LP15	65	55		A-3	FC
HF		12x18	S	LP05	25	22LP			
		9x36	S	LP05					
		8x9	S	LP01					
1L	QK	9x55	S	49	300	49	049	A	T
1A	QA	9x51	S	44	200	44	044	B	K
1R	QX	8x48	A	29AL	150A	30AL		B(AL)	AS
2	GA	9x26	S	16	80	16	016	C	Q
2R	GX	7x33	A	16AL	80A	22AL		C(AL)	AQ
3	UA	6x19	S	7	35	7	007	D-1	G
3R	UX	7x16	A	6AL	33A	7AL		D-1(AL)	AG
4	JA	4x13	S	3	10	3	003	D	F
LB		2x12	S	LB		LB		LB	LB

A= Aluminum; S= Steel

Info. by Metheson Tri-Gas



Pure Gases

40

Krypton

Pure Gases

Description	Kr
Formula	
Gas Data	
Molecular Weight:	83.80
Density:	3.479 kg/m ³ @ 21.1°C, 101.325 kPa 0.2172 lb/ft ³ @ 70°F, 14.696 psia
Specific Volume:	0.2874 m ³ /kg @ 21.1°C, 101.325 kPa 4.604 ft ³ /lb @ 70°F, 14.696 psia
Shipping Information	
CAS Registry Number:	7439-90-9
UN Number:	UN 1056
ECCN Number:	EAR99
DOT Proper Shipping Name:	Krypton, Compressed
DOT Classification:	2.2 (Nonflammable Gas)
DOT Label:	NON-FLAMMABLE GAS
TC Shipping Name:	Krypton, Compressed
TC Classification:	2.2
TC Label:	NON-FLAMMABLE GAS, NON-POISONOUS GAS

Cylinder Specifications					
Cylinder Size	Valve Outlet CGA No.	Pressure psig @ 70°F	Pressure kPa @ 21.1°C	Approximate Ship Weight lb	kg
1A	580	1,335	9,204	162	73
2	580	1,335	9,204	Varies	Varies
3	580	1,335	9,204	Varies	Varies
4	580	1,335	9,204	Varies	Varies
6	580	1,260	8,687	20	9
6B	580	680	4,688	20	9
7A	580	725	4,999	6	3
7	580	220	1,517	6	3

Gas Grade Purity Specifications	Product Code	Cylinder Size	Content US	Metric	Equipment Recommendations	Model No.	Page No.
Krypton, Research Purity 99.999%	G2155101	1A	177 ft ³	5000 L	Dual Stage Reg.	Series 3810-580	318
<i>Quantitated Analysis</i>	G2155140	2	71 ft ³	2000 L	Single Stage Reg.	Series 3510-580	312
Argon	G2155150	3	36 ft ³	1000 L	LB Regulator	Series 3570-170	314
Carbon Dioxide	G2155165	4	7.1 ft ³	200 L	Low Dead Volume Reg.	390A-580	315
Carbon Monoxide	G2155178	6	3.33 ft ³	100 L	Cross Purge	474-580	422
Helium	G2155179	6B	1.77 ft ³	50 L	Outlet Plug Wrench	TW-4	430
Hydrogen	G2155182	7A	0.88 ft ³	25 L			
Methane	G2155181	7	0.25 ft ³	7 L			
Nitrogen							
Oxygen							
THC							
Water							
Xenon							

*A Certificate of Analysis will be provided with each cylinder at a nominal charge.

High-Pressure S.S. Gas Cylinders

High-Pressure Stainless Steel Gas Cylinders

Specifications

There are many different gas cylinder options available for packaging of Air Liquide specialty gas products. While most of our gas cylinders remain the property of Air Liquide, we also fill customer-owned cylinders provided they meet all appropriate safety requirements.

HP Steel Cylinder Size	DOT Specification	Service Pressure psig	Approximate Capacity†		Outside Diameter inches	Height* inches	Tare Weight** lbs.	Internal Water Volume††	
			cu. ft.	liters				cu. in.	liters
50	9809-1***	2900	335	9373	9	58.2	130	3051	50
49	3AA	2400	277	7844	9.25	55	143	2990	49
44	3AA	2265	232	6570	9	51	133	2685	44
44H	3AA	3500	338	9571	10	51	189	2607	44
44HH	3AA	6000	433	12261	10	51	303	2363	43
16	3AA	2015	76	2152	7	32.5	63	976	16
7	3AA	2015	33	934.6	6.25	18.5	28	427	7
3	3AA	2015	14	396.5	4.25	16.75	11	183	3
LB/LBX®	3E	1800	2	53.8	2	12	3.5	27	0.4

* Without valve.

** With valve, nominal.

*** UN/ISO specification.

† For N₂ at 70°F 1 atm.

†† Nominal.

® Nonreturnable cylinder. Price of cylinder included in the price of gas.

Note: LBX is an LB cylinder with a CGA valve other than 170 or 180.



Krypton Cost? Web info. are questionable!



How Much does Krypton Cost?

mtadc
Answers Expert

Glad you asked...

The cost of krypton is \$33/L or about \$113.56 per gallon. The earth's crust holds 150 parts per trillion by weight. The atomic number is 36 and the atomic weight is 83.60.



Resolved Question

Show me another »

What is the cost of krypton?

princess <3

4 years ago

Report Abuse



Best Answer - Chosen by Voters

The price of 99.995 % pure krypton gas is about 65.30€ / dm³ in small quantities. (US\$ 86 per liter). Plus a deposit for the cylinder it comes in.

But if you buy 300 liters at a time, the price drops to about \$6 a liter.

Source(s):

<http://www.ktf-split.hr/periodni/en/kr.h...>

4 years ago

67% 2 Votes

Report Abuse

\$1.2 / L for 7,500 L
(~\$9,000) for a 44 L
bottle at ~ 130 bar –
9/27/10

Per Pavel Perlov
Global Director of
Business
Development
Electronic
Fluorocarbons, LLC
tel. +1-508-435-7700
fax +1-508-625-1368
mobile: +1-617-592-
3820
email:
pavel@electronicfluoro
carbons.com

Krypton Cost based on Web search

How much is krypton?

In: Science [\[Edit categories\]](#)

[The Social Network Movie](#)

...The Movie of The Year. -Peter Travers, Rolling Stone

[TheSocialNetwork-Movie.com](#)

A:

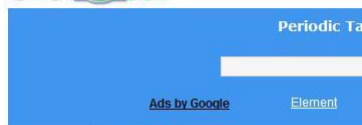
Answer

Krypton is \$30 per gram

Note: 1 L of Krypton = 3.37 gm,

Answer given in left is questionable.

ChemiCool



Ads by Google



Krypton Element Fac

[The Social Network](#)

Abundance earth's crust: 100 parts per trillion by weight, 30 parts per trillion by moles

Abundance solar system: parts per million by weight, parts per million by moles

Cost, pure: \$33 per 100g

Cost, bulk: \$ per 100g

Source: Krypton is obtained commercially by fractional distillation of liquid air.

Isotopes: Krypton has 25 isotopes whose half-lives are known, with mass numbers 71 to 95
⁸⁴Kr and ⁸⁶Kr. The most abundant isotope is ⁸⁴Kr at 57.03%.

Note: \$ 33 / 100 g → ~ \$ 1.1 / L

Seems reasonable

Krypton Gas

Pure Gas: *Krypton*

DESCRIPTION

Krypton is a rare atmospheric gas which is odorless, colorless, tasteless, nontoxic, monatomic and chemically inert. The concentration of Krypton in the atmosphere by volume percent is 1.1×10^{-4} . Krypton is principally shipped and used in gaseous form for excimer lasers, light bulbs, window insulation and R & D laboratory research. Spectra Gases Material Safety Data Sheets (MSDS) are available for Krypton gas and should be used as guidelines in regard to first aid, methods of storage, handling and general use of Krypton.

PURITY SPECIFICATIONS (MAXIMUM IMPURITY LEVELS)*		
Contaminant	Research Grade 99.999%	UHP Grade 99.995%
Argon (Ar)	2.0 ppm	3.0 ppm
Carbon Dioxide (CO ₂)	0.5 ppm	1.0 ppm
Carbon Tetrafluoride (CF ₄)	0.5 ppm	1.0 ppm
Hydrogen (H ₂)	0.5 ppm	3.0 ppm
Krypton (Kr)	0.5 ppm	1.0 ppm
Neon (Ne)	0.5 ppm	3.0 ppm
Nitrogen (N ₂)	2.0 ppm	3.0 ppm
Oxygen (O ₂)	0.1 ppm	1.0 ppm
Water (H ₂ O)	0.2 ppm	1.0 ppm
Xenon	5.0 ppm	25.0 ppm

* Higher purities are available upon request.

Info. By Spectra Gases

CYLINDER INFORMATION					
Purity	Cylinder Size*	Valve Outlet*	Volume Liters	Gross Weight Lbs/Kg	Pressure Psig/Bar
Research Grade	1	580	10000	213 / 97	2300 / 160
	2	580	5000	155 / 70	1350 / 94
	3	580	2000	63 / 29	1500 / 104
	4	580	1000	31 / 14	1450 / 101
	5	580	500	16 / 7	2000 / 139
	LB	580/170	50	6 / 3	1400 / 98
UHP Grade	1	580	10000	213 / 97	2300 / 160
	2	580	5000	155 / 70	1350 / 94
	3	580	2000	63 / 29	1500 / 104
	4	580	1000	31 / 14	1450 / 101
	5	580	500	16 / 7	2000 / 139
	LB	580/170	50	6 / 3	1400 / 98
Non-Refillable Cylinders	D1	580	400	16 / 7	1300 / 91
	D2	580	200	11 / 5	1050 / 73
	D2	580	100	10 / 5	575 / 41
	D3	580	50	7 / 3	675 / 48
	D3	580	25	6 / 3	350 / 25
	D7	580	20	3 / 1	240 / 18
	D7	580	12	3 / 1	140 / 11

* Additional cylinder sized and/or valve outlets are available upon request.

(Continued)



Spectra Gases Inc.

Branchburg, New Jersey 08876 USA, tel: 1.908.252.9300, toll free: (US & Canada) 1.800.932.0624, www.spectragases.com

CTS WELCO



Thermo Valve (new type?)

G55 Brass Diaphragm Valves For Specialty Gases



- Forged Brass body and brass internal components for high purity gases
- Five (5) Phosphor Bronze diaphragms for high vacuum and high pressure integrity
- Designed for easy open and easy close operation

Info. on some common gas

From AirProducts web site <http://www.airproducts.com/> on 9/23/98:

gas ►	NH ₃		Ar		He		CO ₂		H ₂		N ₂		O ₂		Air	
Spec vol at 70°F and 1 atm ►	22.5 ft ³ /lb		9.7 ft ³ /lb		96.7 ft ³ /lb		8.74 ft ³ /lb		192.0 ft ³ /lb		13.8 ft ³ /lb		12.1 ft ³ /lb		13.3 ft ³ /lb	
cylinder designation ▼	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F	dim (in.)	psig at 70°F
AA	15 x 52	114														
A	10 x 49	114	9 x 55	2640	9 x 55	2640			9 x 55	2640	9 x 55	2640	9 x 55	2640	9 x 55	2640
A(AL)	10 x 52	2000									10 x 52	2200				
B	9 x 51	114	9 x 51	2490	9 x 51	2490	9 x 51	830	9 x 51	2265	9 x 51	2492				
B (AL)	8 x 48	114	8 x 48	2000			8 x 48	830	8 x 48	2000	8 x 48	2000			8 x 48	2000
BX			10 x 51	6000	10 x 51	6000			10 x 51	6000	10 x 51	6000				
BY			9 x 51	3500	9 x 51	3500			9 x 51	3500	9 x 51	3500				
C	8 x 22	114	7 x 33	2215	7 x 33	2215			7 x 33	2015	7 x 33	2015	7 x 33	2215	7 x 33	2215
D			4 x 17	2215	4 x 17	2215	4 x 17	830	4 x 17	2015	4 x 17	2015	4 x 17	2215		
D-1	7 x 19	114	7 x 16	2000					7 x 19	2015						
D-1 (AL)	7 x 16	114														
D	4 x 17	114														
L.B.			2 x 12	1800	2 x 12	1800					2 x 12	1800	2 x 12	1800		
L.B.I.	2 x 12	114														
4X(AL)-100			4 x 10	850	4 x 10	900			4 x 10	2000	4 x 10	850	4 x 10	850		
4X(AL)-60			4 x 10	425							4 x 10	425				

Info. on some common gas

Other info	gas	NH ₃	Ar	He	CO ₂	H ₂	N ₂	O ₂	Air
color/odor		none/strong	none/none	none/none	none/none	none/none	none/none	none/none	none/none
flamm		mod	not	not	not	YES 4 -- 75%	not	*	**
Toxic		yes	asphyxiant	asphyxiant	asphyxiant	asphyxiant	asphyxiant	*	
TWA		25 ppm (ACGIH)	none		5,000 ppm (ACGIH)				
MW		17.03	39.95	4.003	44.01	2.016	28.01	32.00	
DOT Haz Class		Nonfam Gas (2.2)	Nonfam Gas (2.2)	Nonfam Gas (2.2)	Nonfam Gas (2.2)	Flam Gas (2.1)	Nonfam Gas (2.2)	Nonfam Gas (2.2)	Nonfam Gas (2.2)
DOT Label		Nonflammable Gas	Nonflammable Gas	Nonflammable Gas	Nonflammable Gas	Flammable Gas	Nonflammable Gas	Oxidizer and Nonflammable Gas	Nonflammable Gas
DOT ID No.		UN 1005	UN 1006	UN 1046	UN 1013	UN 1049	UN 1066	UN 1072	UN 1002
CAS No.		7664-4-7	7440-37-1	7440-69-7	124-38-9	1333-74-0	7727-37-9	7782-44-7	----
Compatible		Iron and steel recommended. In presence of tr amounts of water, NH ₃ vigorously attacks Cu, Ag, Zn, and their alloys. Combines with Hg to form explosive compounds.	Noncorrosive, most common structural materials can be used.	Noncorrosive, most common structural materials can be used.	Noncorrosive, most common structural materials can be used. If moisture is present, materials must resist carbonic acid	Noncorrosive, most common structural materials can be used	Noncorrosive, most common structural materials can be used.	Noncorrosive, structural materials must be suitable for oxygen service	Noncorrosive, most common structural materials can be used.

* Strong oxidizer, regarded as non-toxic, but exposure to high concentrations adversely affects pulmonary and central nervous systems. Supports and vigorously accelerates combustion; avoid all contact with oil, grease, or other combustible or flammable materials.

** At high pressure can accelerate the burning of combustible and flammable materials.